CLAIMS

What is claimed is:

[c01] 1. A system for the optical interrogation of combinatorial arrays, comprising:

a combinatorial array having a surface with a plurality of predefined regions, the plurality of predefined regions comprising one or more samples and reference regions;

a radiation source operable to expose each of the plurality of predefined regions of the combinatorial array to incident radiation of at least one selected wavelength and intensity;

a detector operable to measure resultant radiation for each of the plurality of predefined regions of the combinatorial array; and

a computer to functionally control the operation of the system and determine the relative performance of each of the plurality of predefined regions of the combinatorial array.

[c02] 2. The system of claim 1, wherein the sample and one or more of the plurality of predefined reference regions are measured simultaneously.

[c03] 3. The system of claim 1, wherein the surface of the combinatorial array is concave or convex.

[c04] 4. The system of claim 1, wherein the combinatorial array comprises a substrate with a deposited coating.

[c05] 5. The system of claim 4, wherein the substrate itself exhibits inherent luminescence.

[c06] 6. The system of claim 4, wherein the coating itself exhibits inherent luminescence.

[c07] 7. The system of claim 4, wherein the coating comprises a transparent material or an opaque material.

[c08] 8. The system of claim 4, wherein the coating comprises an organic material or an inorganic material.

[c09] 9. The system of claim 4, wherein the substrate is comprised of a material selected from the group consisting of plastic, glass, metal, and composite materials.

[c10] 10. The system of claim 9, wherein the plastic comprises a film or plaque.

[c11] 11. The system of claim 9, wherein the substrate comprises a transparent material or an opaque material.

[c12] 12. The system of claim 1, wherein one or more of the plurality of predefined regions of the combinatorial array has been physically exposed to at least one test selected from the group consisting of abrasion testing, exposure to temperature, elongation testing, exposure to at least one solvent for a predetermined period of time, exposure to at least one fluid for a predetermined period of time, and subjection to hydrolytic stability testing.

[c13] 13. The system of claim 1, wherein one or more of the plurality of predefined regions of the combinatorial array further comprises at least one luminescent compound for reacting with the incident radiation.

[c14] 14. The system of claim 13, wherein the luminescent compound is selected from the group consisting of a luminescent compound which is an organic dye, a luminescent compound which is an insoluble luminescent particle, a nanoparticle, a pigment, a luminescent compound whose emission properties are not affected by the microenvironment, and a luminescent compound whose emission properties are affected by the microenvironment.

[c15] 15. The system of claim 1, further comprising a wavelength selection device operable to receive incident radiation and transmit incident radiation having a selected range of wavelengths.

[c16] 16. The system of claim 1, further comprising one or more filters for selectively absorbing incident radiation of a selected range of wavelengths.

[c17] 17. The system of claim 1, wherein the wavelength of the radiation is from about 20 nm to about 25,000 nm.

[c18] 18. The system of claim 1, further comprising an imaging device 34 operable to obtain an image of the resultant radiation for each of the plurality of predefined regions of the combinatorial array.

[c19] 19. A method for the optical interrogation of a combinatorial array, comprising the steps of:

exposing each of a plurality of predefined regions of a combinatorial array to incident radiation of at least one selected wavelength and intensity;

collecting resultant radiation for each of the plurality of predefined regions of the combinatorial array;

applying a predetermined test to determine the relative performance of each of the plurality of predefined regions of the combinatorial array, and

compensating for variable curvature of the combinatorial array.

[c20] 20. The method of claim 19, wherein the plurality of predefined regions of the combinatorial array comprise one or more samples and reference regions.

[c21] 21. The method of claim 20, wherein the reference regions are samples.

[c22] 22. The method of claim 20 wherein the reference regions are substrate regions between deposited samples.

[c23] 23. The method of claim 20, further comprising the step of measuring the reference sample and one or more of the plurality of predefined regions simultaneously.

[c24] 24. The method of claim 19, wherein the combinatorial array comprises a substrate with a deposited coating.

[c25] 25. The method of claim 19, wherein the array 12 is a substrate that is either concave or convex.

[c26] 26. The method of claim 24, wherein the substrate exhibits an inherent luminescence.

[c27] 27. The method of claim 24, wherein the coating exhibits an inherent luminescence.

[c28] 28. The method of claim 19, wherein one or more of the plurality of predefined regions of the combinatorial array has been physically exposed to at least one test selected from the group consisting of abrasion testing, exposure to temperature, elongation testing, exposure to at least one solvent for a predetermined period of time, exposure to at least one fluid for a predetermined period of time, and subjection to hydrolytic stability testing.

[c29] 29. The method of claim 19, wherein one or more of the plurality of predefined regions of the combinatorial array further comprises at least one luminescent compound for reacting with the incident radiation.

[c30] 30. The method of claim 29, wherein the luminescent compound is selected from the group consisting of a luminescent compound which is an organic dye, a luminescent compound which is an insoluble luminescent particle, a nanoparticle, a pigment, a luminescent compound whose emission properties are not

affected by the microenvironment, and a luminescent compound whose emission properties are affected by the microenvironment.

[c31] 31. The method of claim 19, further comprising the step of selectively collecting incident radiation of one or more predetermined wavelengths.

[c32] 32. The method of claim 19, further comprising the step of collecting spectral data of the resultant radiation for each of the plurality of predefined regions of the combinatorial array.

[c33] 33. A method for the optical interrogation of combinatorial arrays, comprising the steps of:

providing a combinatorial array having a surface with a plurality of predefined regions, the plurality of predefined regions comprising one or more reference samples;

exposing each of the plurality of predefined regions of the combinatorial array to incident radiation of at least one selected wavelength and intensity;

collecting resultant radiation for each of the plurality of predefined regions of the combinatorial array; and

applying a predetermined test to determine the relative performance of each of the plurality of predefined regions of the combinatorial array.

[c34] 34. The method of claim 33, further comprising the step of measuring the reference sample and one or more of the plurality of predefined regions simultaneously.

[c35] 35. The method of claim 33, wherein the combinatorial array comprises a substrate with a deposited coating.

[c36] 36. The method of claim 35, wherein the substrate exhibits an inherent luminescence.

[c37] 37. The method of claim 35, wherein the coating exhibits an inherent luminescence.

[c38] 38. The method of claim 35, wherein the coating comprises a transparent material or an opaque material.

[c39] 39. The method of claim 35, wherein the coating comprises an organic material or an inorganic material.

[c40] 40. The method of claim 35, wherein the substrate is comprised of a material selected from the group consisting of plastic, glass, metal, and composite material.

[c41] 41. The method of claim 40, wherein the plastic comprises a film or plaque.

[c42] 42. The method of claim 40, wherein the substrate comprises a transparent material or an opaque material.

[c43] 43. The method of claim 33, wherein one or more of the plurality of predefined regions of the combinatorial array has been physically exposed to at least one test selected from the group consisting of abrasion testing, exposure to temperature, elongation testing, exposure to at least one solvent for a predetermined period of time, exposure to at least one fluid for a predetermined period of time, and subjection to hydrolytic stability testing.

[c44] 44. The method of claim 33, wherein one or more of the plurality of predefined regions of the combinatorial array further comprises at least one luminescent compound for reacting with the incident radiation.

[c45] 45. The method of claim 44, wherein the luminescent compound is selected from the group consisting of a luminescent compound which is an organic dye, a luminescent compound which is an insoluble luminescent particle, a nanoparticle, a pigment, a luminescent compound whose emission properties are not

affected by the microenvironment, and a luminescent compound whose emission properties are affected by the microenvironment.